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ABSTRACT

The first purpose of this study was to analyze the results of the confirmatory factor analyses, via EQS, with regard to the latent structures of the Learning and Study Strategies Inventory (LASSI) (C. Weinstein, D. Palmer, and A. Schulte, 1987) as proposed by S. Olejnik and S. Nist (1992), A. Olivarez and M. Tallent-Runnels (1994), B. Olaussen and I. Braten (1998), and the model that evolved from the exploratory factor analysis of the current data set. Data were from two samples, one of 319 college freshmen and the other of 2,535 college freshmen. The aim was not only to determine the model that best fits the data set, but also to investigate how replicable these models are with a large sample size. The model proposed by Olaussen and Braten appears to have the best fit to the data of this study. The two-factor model that evolved from the exploratory factor analysis of the data did not adequately explain the data under the scrutiny of confirmatory factor analysis. This study supports the three latent structure model of the LASSI instrument. The second purpose of the study was to examine the reliability (internal consistency) of the 10 LASSI subscales. The results show that, in some subscales, the Cronbach alpha obtained from this study appear to be slightly better than the indices reported in the manual. Overall, the alpha coefficients obtained in this study reasonably matched those reported in the LASSI manual. (Contains 2 tables, 4 figures, and 16 references.) (Author/SLD)

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The Latent Structures of the Learning and Study Strategies Inventory (LASSI): A comparative Analysis.

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ABSTRACT

The Latent Structures of the Learning and Study Strategies Inventory (LASSI): A comparative Analysis.

The first purpose of this study is to comparatively analyze the results of the confirmatory factor analyses, via EQS, with regard to the latent structures of the LASSI instrument as proposed by Olejnik and Nist (1992), Olivarez and Tallent-Runnels(1994), Olaussen and Braten (1998), and the model which evolved from the exploratory factor analysis of the current data set. The aim was not only to determine the model that best fits our data set, but also to investigate further how replicable these models are with a large sample size. Model 4 which is the model proposed by Olaussen and Braten appears to be the model with the best fit to the data of this study. The two-factor model which evolved from the exploratory factor analysis of our data did not adequately explain the data under the scrutiny of confirmatory factor analysis. This study replicated the works of Olejnik and Nist (1992), Olivarez and Tallent-Runnels(1994), Olaussen and Braten (1998), and in turn bestowed more credence to the three latent structure model of LASSI instrument.

The second purpose was to examine the reliability (internal consistency) of the ten LASSI subscales. The result showed that in some subscales the Cronbach alpha obtained from this study appeared to be slightly better than the indices reported in the manual. Overall, the alpha coefficients obtained in this study reasonably matched those reported in the LASSI manual.

The Latent Structures of the Learning and Study Strategies Inventory (LASSI): A comparative Analysis.

Introduction

The learning and study strategies inventory (LASSI) was developed by (Weinstein, Palmer, & Schulte, 1987) to be used in assessing college students' learning and study skills. It is an instrument designed to measure how adult students study and learn by tapping into their thought processes that can either enhance or inhibit learning. Those thought processes that inhibit learning can subsequently be altered by the appropriate educational intervention. According to LASSI manual, the instrument is meant to be used as a diagnostic and a prescriptive tool, and also as an evaluative and a counseling tool (Weinstein, 1987).

LASSI has been used in a number of different ways to investigate learning and study skills strategies (Benz, Fabian, & Nelson, 1996; Deming, Valeri-Gold, & Idleman, 1994; Schumacker, Bembry, & Sayler, 1995; Nist, Mealey, Simpson, & Kroc, 1990). In Benz et al's (1996) study, they investigated the usefulness of LASSI, that was designed for college students, as a diagnostic and prescriptive tool in assessing study skills of secondary school students with learning disabilities. They concluded that it can be helpful in providing information in individualized instruction at the secondary school level.

Deming's et al (1994) study examined the reliability and validity of the LASSI instrument by analyzing data collected from 99 college developmental studies students. Their results showed that with the exception of the Study Aids dimension, the reliability of the other nine dimensions were reasonably closed to those reported in the LASSI manual. They however concluded by reporting that more research is needed in the reliability of the Study Aids subscale and the validity of the instrument particularly with college developmental students.

In Schumacker's et al (1995), they studied the relationship between LASSI scores and academic achievement of gifted college bound students. The analysis of their results showed that students who were successful in the program had high LASSI scores in the following dimensions: concentration and attention, selecting main ideas, information processing, and anxiety. They concluded that scoring low in these dimensions could be an indication of potential problem that could result in students failure if no intervention is instituted.

In Nist's et al (1990) study, the purpose was to investigate the use of LASSI to measure change in cognitive and affective growth of regularly-admitted students (RAS) and developmental studies students (DSS) in a study strategy course. The other purpose was to examine the predictability of LASSI with regard to these students grades in other courses. The researchers reported the instrument was able to show, in both RAS and DSS, that there were cognitive and affective growth following a study strategy course. However, according to the study, LASSI was only predictive of RAS grades; consequently, they recommended not to use LASSI in predicting DSS grades in regular college courses.

One of the concerns that was raised by Mealey (1988) and Nist et al was that the LASSI manual recommends the use of LASSI for college freshmen enrolled in developmental studies courses or learning strategies and yet the instrument was normed with a sample of 880 incoming freshmen, from only one university, who were not even enrolled in a learning and study strategy course. The other concern was the generalizability of the normed scores since the instrument was normed with data from only one university.

The LASSI manual clearly stated the psychometrics characteristics of the instrument except in the area of the construct validity. The manual was not clear on how the theoretical framework that went to the development of the instrument was validated. Perkins(1991) attempted to test the construct validity of LASSI from the item level perspective via factor analysis. She extracted 20 factors instead of the ten as was stated in the manual; consequently, she concluded that the instrument lacks construct validity.

However some researchers have, alternatively, investigated the construct validity of LASSI from the perspective of the subscales (Olejnik, & Nist, 1992; Olaussen, & Braten, 1998; Murphy, & Alexander, 1998; Olivarez & Tallent-Runnels, 1994). In Olejnik and Nist (1992) study, they proposed a measurement model with three latent structures and used LASSI 10 subscales, generated from 143 developmental studies students, to validate them. The three latent factors were labeled as follows: effort-related activities, goal orientation, and cognitive activities. Olaussen and Braten (1998) tested and validated the measurement model proposed by Olejnik and Nist, but with some modifications, with 173 Norwegian college students who are majoring in education. In Murphy and Alexanders' (1998) study, in which 139 Singaporean female high school students were subjects, they failed to validate the three latent structures proposed and validated by Olivarez and Tallent-Runnels (1994).

The Objective of the study

The first purpose of this study is do a comparative analysis on the results of the confirmatory factor analyses, via EQS, with regard to the latent structures of the LASSI instrument as proposed by Olejnik and Nist(1992), Olivarez and Tallent-Runnels(1994), Olaussen and Braten (1998), and the two-factor model which evolved from the exploratory factor analysis of the current large data set. The goal here is not only to investigate which of these four models can give the best explanation of the data generated by student responses in this college, but also to examine further the construct validity of LASSI with a large sample size. The second purpose is to look into the internal consistency reliability of the ten LASSI subscales.

Instrument

LASSI is a 77-item, in a likert-type five-point format, instrument designed to ascertain the learning and study strategies of college students. It has ten subscales which are as follows: Attitude (ATT), Motivation (MOT), Time Management (TMT), Anxiety (ANX), Concentration (CON), Information Processing (INP), Selecting Main ideas (SMI), Study Aids (STA), Self Testing (SFT), and Test Strategies (TST).

The Attitude subscale relates to the attitude and students' interest in college. This is measured by the following items: 5, 14, 18, 29, 38, 45, 51, 69. The Motivation subscale deals with students' motivational characteristics and is measured by the following items: 10, 13, 16, 28, 33, 41, 49, 56. The Time Management subscale examines the effective use of students' time with regard to academic task, and is measured by items 3, 22, 36, 42, 48, 58, 66, 74. The Anxiety subscale addresses the worrisome level of students with regard to school. Items 1, 9, 25, 31, 35, 54, 57, 63, measure this scale. The Concentration Subscale relates to students' attention to academic matters. The following items 6, 11, 39, 43, 46, 55, 61, 68 measure this scale. The Information Processing subscale relates to how students process knowledge and is measured by items 12, 15, 23, 32, 40, 47, 67, 76. Selecting Main Ideas is a scale that deals with students' ability to ascertain important information in an academic exercise. This scale is measured by items 2, 8, 60, 72, 77. The Study Aids scale addresses students' use of support system for their learning and development. Items 7, 19, 24, 44, 50, 53, 62, 73 measure this dimension. The Self Testing scale focuses on how students prepare for classes and tests. Items 4, 17, 21, 26, 30, 37, 65, 70 measure this scale. The Test Strategies is the scale that deals the strategies students apply in test taking. Items 20, 27, 34, 52, 59, 64, 71, and 75, measures this scale. For more detail definitions regarding these ten scales refer to the LASSI user's manual (Weinstein, 1987).

In this college, LASSI is used to diagnose students' deficiencies in these ten dimensions and a prescriptive measure is in turn designed as a form of intervention. Specifically, LASSI is instrumental in the design of the content of reading and the university orientation courses here at the College based on the responses of the incoming freshmen on the instrument.

Theoretical Framework

The two-factor measurement model which evolved from the exploratory factor analysis of the current data(See Table 1), clearly shows that Study Aids(STA), Information processing(INP), Motivation(MOT), Time Management(TMT), and Self-Testing(SFT) are indicators of one construct. The following variables loaded on the other factor: Selecting Main Ideas (SMI), Anxiety(ANX), Test Strategies(TST), Concentration(CON), and Attitude(ATT).(See Figure 1)

Olivarez and Tallent-Runnels(1994) proposed and validated a structural measurement model with three latent factors by using the responses of high school students via the Learning and Study Strategies Inventory for High School(LASSI-HS). They Labeled the three constructs as Affective/effort-related activities, Cognitive activities, and Anxiety-arousing activities. They proposed that Time Management(TMT), Concentration(CON), Attitude(ATT), and Motivation(MOT) will load on the factor Affective/effort-related activities, while Information Processing(INP), Study Aids(STA), and Self-Testing(SFT) are the indicators of the construct Cognitive activities. The third construct, Anxiety-arousing activities, will have the following indicators: Anxiety(ANX), Selecting Main

Ideas(SMI) and Test Strategies(TST). They also hypothesized all three constructs will be correlated (See Figure 2).
Olejnik and Nist proposed that the LASSI ten subscales can be explained by three latent structures. They specified that Motivation(MOT), Time Management(TMT), Concentration(CON), and Attitude(ATT) will load on the first factor which was labeled Effort related activities, while Concentration(CON), Anxiety(ANX), Test Strategies(TST) and Selecting Main Ideas(SMI) will load on the second factor labeled Goal orientation. The third factor labeled Cognitive activities will have the following loadings: Attitude(ATT), Selecting Main Ideas(SMI), Information processing(INP), Study Aids(STA), and Self-Testing(SFT). They also stipulated that the three factors will be correlated(See Figure 3).

Olaussen and Braten(1998) tested and validated Olejnik and Nist's proposal but with slight modification. On the construct Effort Related Activities, the variable Test Strategies was hypothesed as an additional indicator. The second construct Goal orientation was also modified by allowing two new variables, Attitude(ATT) and Information Processing(INP), as additional indicators. The variable Attitude(ATT) was not allowed to load on the third construct Cognitive activities(See Figure 4).

Subjects

There were two separate sample sizes. The first consisted of 319 incoming freshmen who matriculated at the college in the Fall 1999. Their actual responses were used to examine the internal consistency reliability of each of the LASSI ten subscales. The second sample size consisted of 2535 incoming freshmen whose LASSI information have been accumulating in the database at the College for several years. In this second sample, the only usable information available with regard to LASSI are the scores on the ten subscales. Their actual student responses were not part of the database.

Procedure

The first sample, which consisted of 319 incoming freshmen, was used to investigate the internal consistency of the ten scales. This was because of the availability of the students' actual responses. SPSS package(version 8.0) was used to examine the internal consistency.

The second sample, which consisted of LASSI data collected from 2535 incoming freshmen over the years was first subjected to an exploratory factor analysis (EFA). In this data set each of the ten scales represented a variable. The EFA yielded two factors, loadings less than .5 were suppressed (See Table 1), which were in turn submitted for confirmatory factor analysis via EQS (Bentler, 1995). Using the second sample, the measurement models proposed by Olejnik and Nist(1992), Olivarez and Tallent-Runnels(1994), and Olaussen and Braten (1998) were also separately submitted for confirmatory factor analysis via EQS.

Table 1. Rotated Factor Solution of the Second Independent Sample.

Variables	Factor(1)	Factor(2)
Attitude (ATT)		.570
Motivation (MOT)	.647	
Time Management (TMT)	.586	
Anxiety (ANX)		.827
Concentration (CON)		.736
Information Processing (INP)	.742	
Selecting Main Ideas (SMI)		.710
Study Aids (STA)	.820	
Self-Testing (SFT)	.841	
Test Strategies (TST)		.844

Results:

The reliability of the LASSI subscales are reported in Table 2. In Table 2, the first row represents the internal consistency of the subscales as derived from this study, while the second row represents the internal consistency as reported in the manual.

The results of the fit indices of the 4 models submitted for confirmatory factor analysis via EQS are shown in Table 3. In Table 3, model 1 refers to the two factor model derived from the current data. Models 2, 3, and 4, refer to the three factor models proposed by Olivarez andTallent-Runnels(1994), Olejnik and Nist(1992), and Olaussen and Braten (1998) respectively. The first row represents the Bentler-Bonett Normed Fit Index (NFI), while the second row presents the Comparative Fit Index (CFI). According to Bentler(1992), in each of these indices, a value greater than .90 represents an acceptable fit to the data.

Since Model 3 is a subset of Model 4, their difference in fit chi-square, in terms of the decrease from Model 3 to Model 4, can be statistically tested for significance (Bentler & chou, 1987). That decrease was $\chi^2(2, N = 2535) = 136.912, p < .05$, which represented a significant improvement in model fit.

Table 2: The Reliability Coefficients (internal consistency) of the LASSI subscales

ATT	MOT	TMT	ANX	CON	INP	SMI	STA	SFT	TST
.78	.78	.85	.83	.86	.83	.74	.72	.82	.80
.72	.81	.86	.81	.84	.83	.74	.68	.75	.83

Table 3: The Fit Indices of the Four Models investigated in this study

	MODEL 1 2-Factor Model	MODEL 2 3-Factor Model	MODEL 3 3-Factor Model	MODEL 4 3-Factor Model
NFI	.87	.93	.96	.97
CFI	.87	.93	.96	.97

Discussions

The first purpose of this study is to comparatively analyze the results of the confirmatory factor analyses, via EQS, with regard to the latent structures of the LASSI instrument as proposed by Olejnik and Nist (1992), Olivarez and Tallent-Runnels(1994), Olaussen and Braten (1998), and the model which evolved from the exploratory factor analysis of the current data set. The aim was not only to determine the model that best fits our data set, but also to investigate further the replicability of these models with large sample size. Clearly, from Table 3 and in addition to the significant difference between the fit Chi-square of Model 3 and Model 4, model 4 which is the model proposed by Olaussen and Braten appears to be the one with the best fit to the data of this study. However, there are some differences between the results of this study and those of Olaussen and Braten in terms of the correlations among the latent constructs. Olaussen and Braten reported in their study a -.01 correlation between Goal orientation and Cognitive activities, which may suggest almost no relationship between the two constructs. They also reported a negative correlation between Effort-related activities and Goal orientation. With regard to Figure 4, the correlation between Goal Orientation and Cognitive Activities is .353, and the correlation between Effort-related activities and Goal orientation is .536.

In the reports of Olejnik and Nist(1992), Olivarez and Tallent-Runnels(1994), and the results of Model 2, 3, and 4, the three latent factors were all positively correlated. This may be suggesting that the three latent constructs are inextricably related, implying that for students to experience a true academic success those three components should be present in some simultaneous fashion.

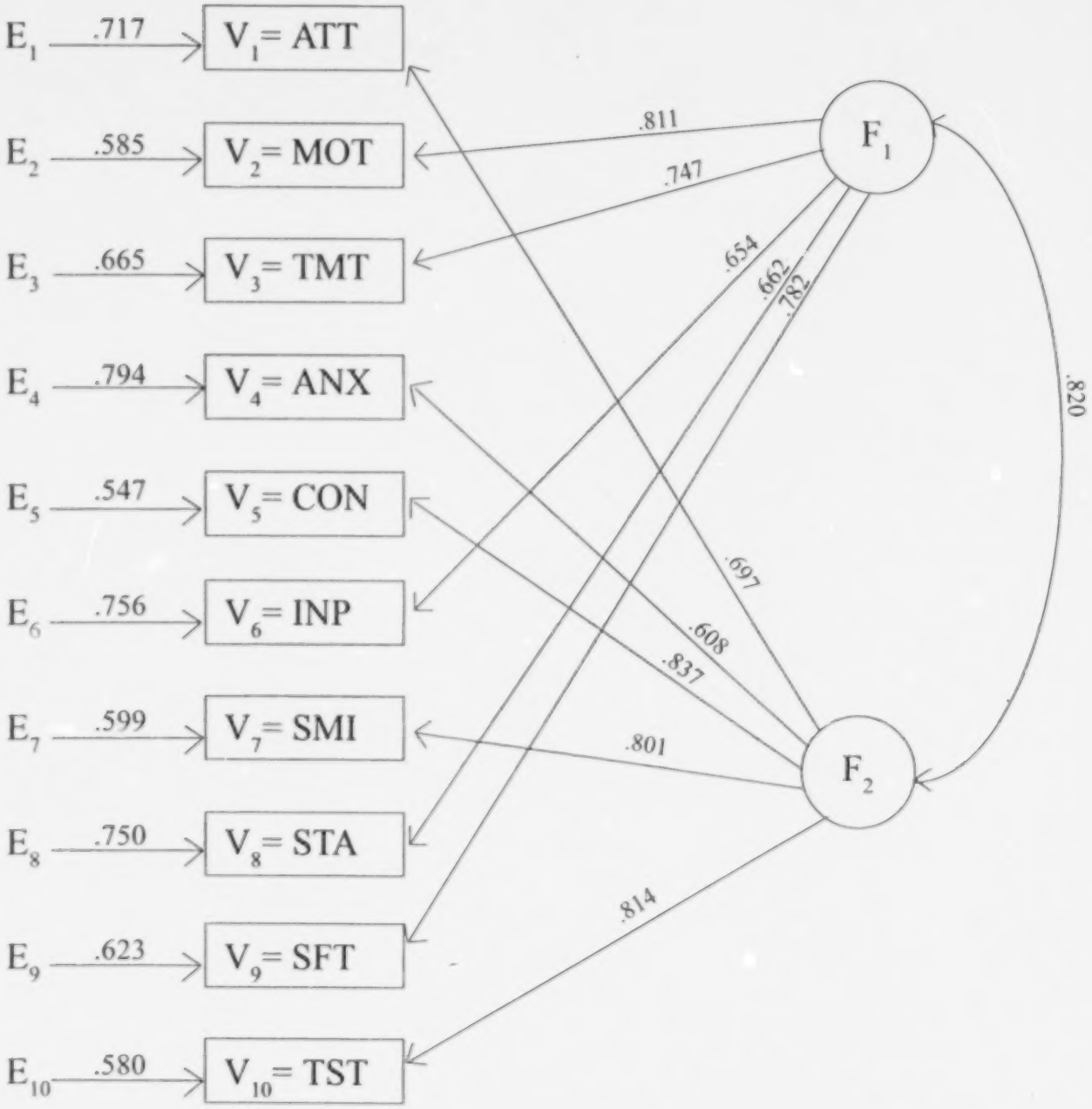
The second purpose is to examine the reliability (internal consistency) of the ten LASSI subscales. Table 2 shows that in some subscales the Cronbach alpha obtained from this study appear to be slightly better than the indices reported in the manual. Overall, the reliability coefficients obtained in this study reasonably match those reported in the LASSI manual.

In summary, the two-factor model which evolved from the exploratory factor analysis of our data did not adequately explain the data under the scrutiny of confirmatory factor analysis. Even though that Model 3 provided an adequate fit to the data set, Model 4 which is perhaps the most complex model offered the best fit to the item responses of LASSI instrument of the students of this college. Clearly, this study replicated the works of Olejnik and Nist (1992), Olivarez and Tallent-Runnels(1994), Olaussen and Braten (1998), and in turn bestowed more credence to the three latent

structure model of LASSI instrument. Furthermore, the reliability coefficients, in terms of the internal consistency of the ten LASSI subscales, reported in this study are consistent with those published in the LASSI manual.

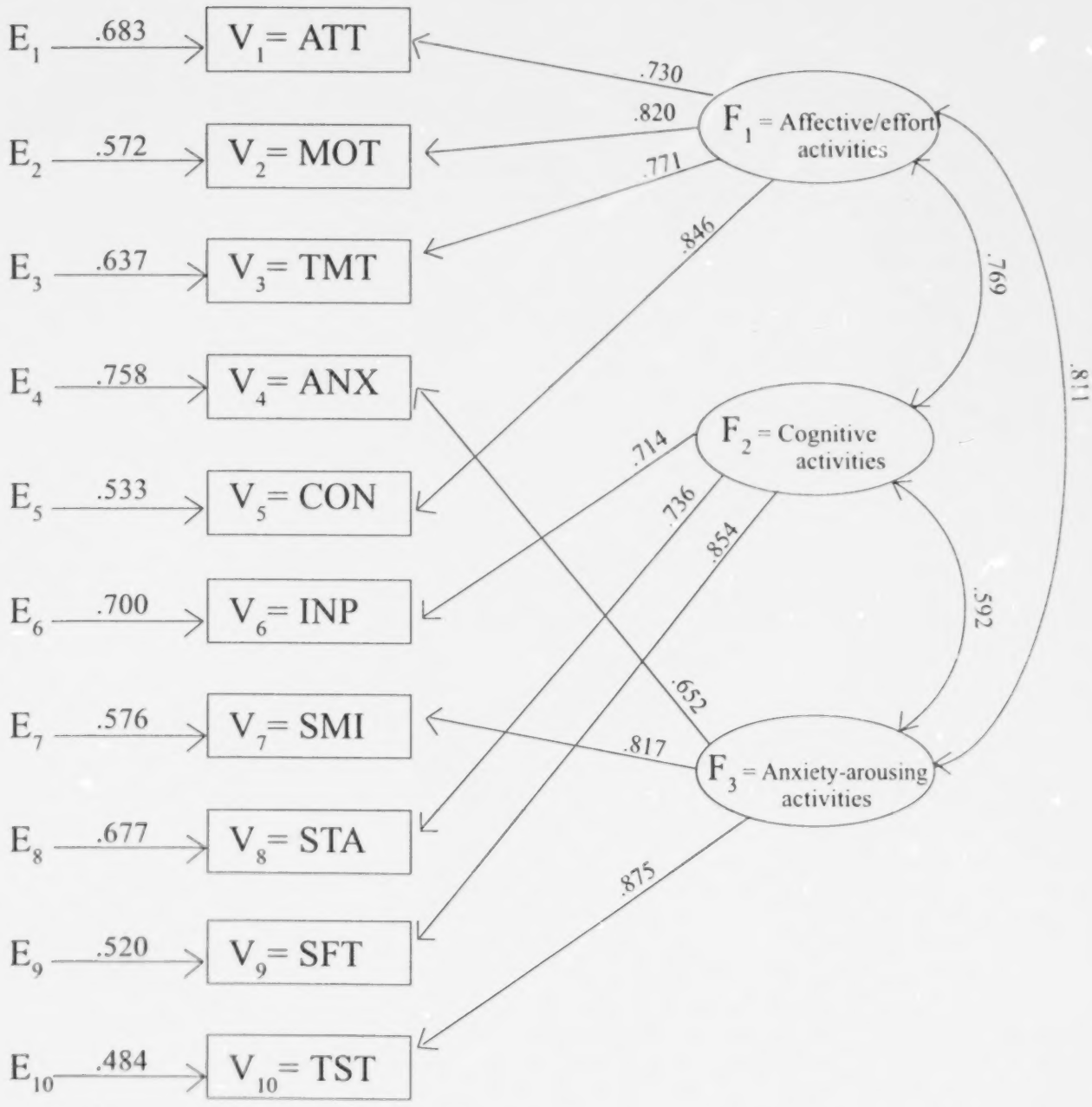
Model 1

Figure 1 - Standardized solution of maximum likelihood parameter estimates of the two-factor measurement model of LASSI which evolved from the exploratory factor analysis of the second independent sample.



Model 2

Figure 2 - Standardized solution of maximum likelihood parameter estimates of the three-factor measurement model of LASSI, proposed by Olivarez & Tallent-Runnels (1994).



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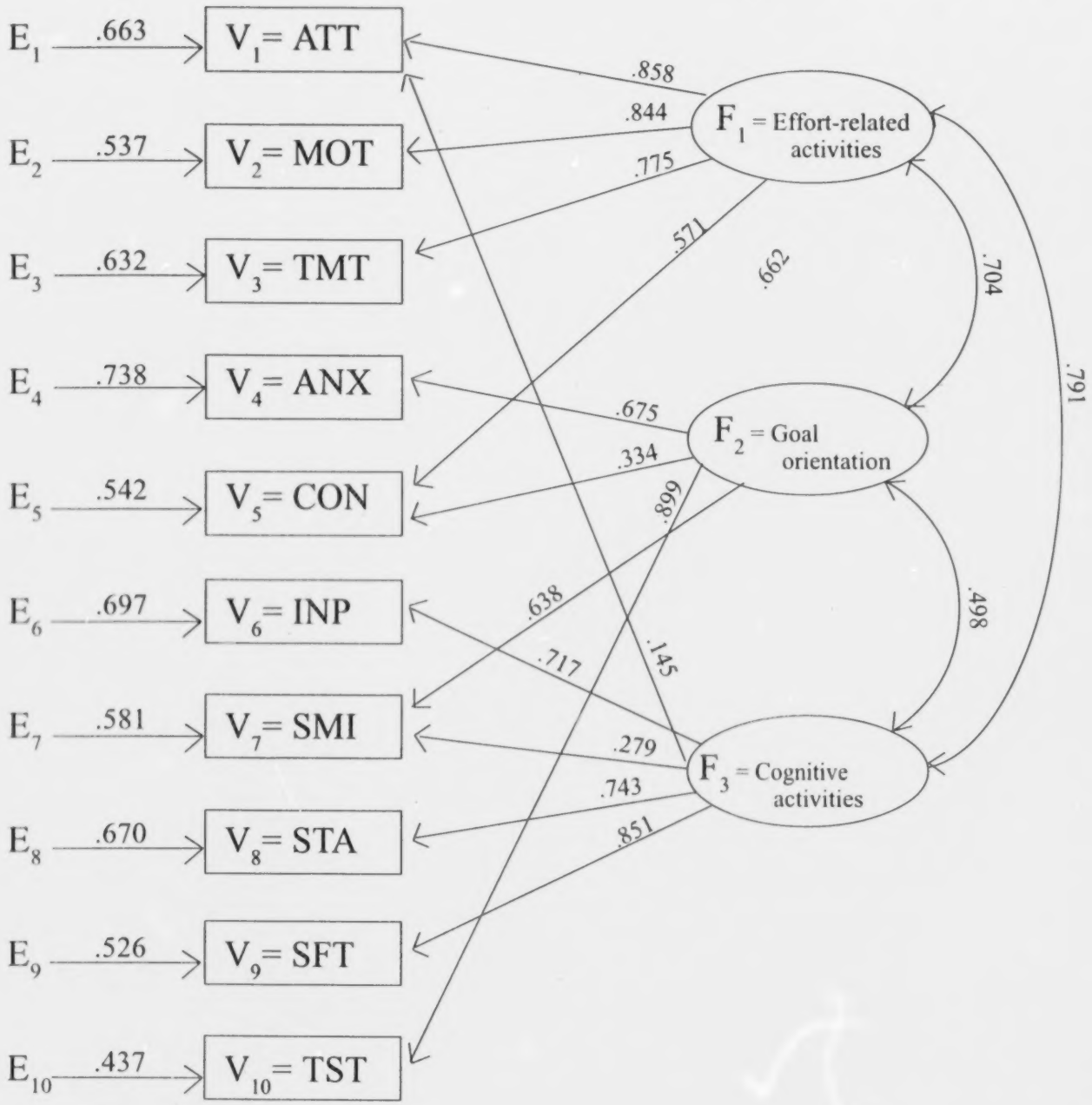
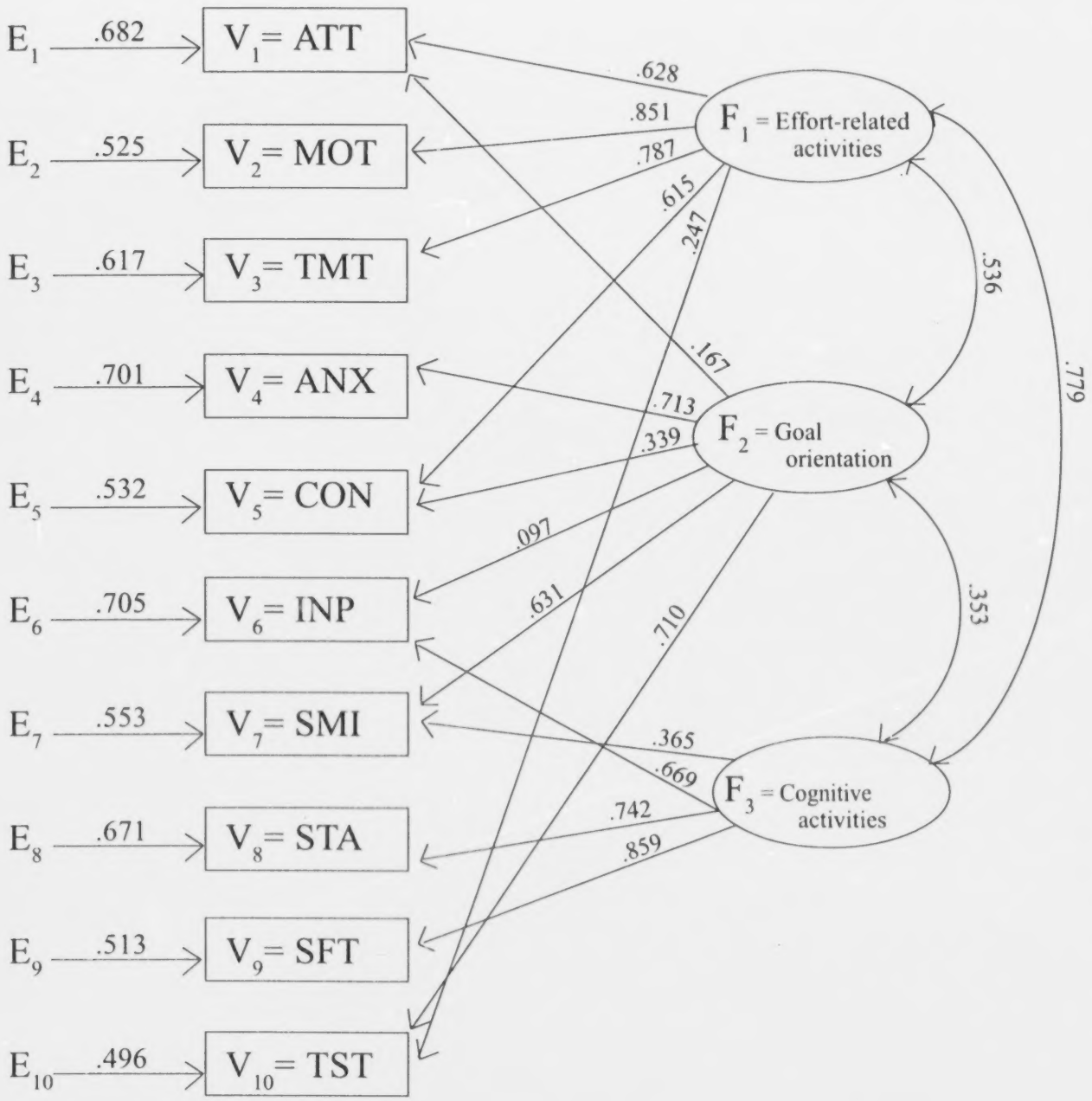
Model 3

Figure 3 - Standardized solution of maximum likelihood parameter estimates of the three-factor measurement model of LASSI, proposed by Olejnik & Nist (1992).



Model 4

Figure 4 - Standardized solution of maximum likelihood parameter estimates of the three-factor measurement model of LASSI, proposed by Olaussen & Braten (1998).



REFERENCES

Bentler, P. M. (1995). EQS Structural Equations Program Manual. Encino, CA: Multivariate Software, Inc.

Bentler, P. M. (1992). On the fit of models to covariances and methodology to the Bulletin. Psychological Bulletin, 112, 400-404.

Bentler, P. M. & Chou, C. P. (1987). Practical issues in structural modeling. Sociological Methods & Research, 16, 78-117.

Benz, C. R., Fabian, M. P., & Nelson, W. R. (1996). Assessing study skills of students with learning disabilities. The Clearing House. 69, 349-353.

Deming, M. P., Idleman, L. S., & Valeri-Gold, M. (1994). The reliability and validity of the learning and study strategies inventory (LASSI) with college developmental students.

Mealey, D. L. (1988). Test review: Learning and study strategies inventory (LASSI). Journal of Reading. 31, 382-385.

Murphy, K. P., & Alexander, P. A. (1998). Using the learning and study strategies inventory-high school version with Singaporean females: Examining psychometric properties. Educational and Psychological Measurement. 58, 493-510.

Nist, S. L., Mealey, D. L., Simpson, M. L., & Kroc, R. (1990). Measuring the affective and the cognitive growth of regularly admitted and developmental studies students using the learning and study strategies inventory (LASSI). Reading Research and Instruction. 30, 44-49.

Olaussen, B. S., & Braten, I. (1998). Identifying latent variables measured by the Learning and Study Strategies Inventory (LASSI) in Norwegian college students. The Journal of Experimental Education. 67, 82-96.

Olejnik, S. F., & Nist, S. L. (1992) Identifying latent variables measured by the Learning and study strategies inventory (LASSI). The Journal of Experimental Education. 60, 151-159.

Olivarez, A., & Tallent-Runnels, M. K. (1994). Psychometric properties of the Learning and Study Strategies Inventory-High school version. The Journal of experimental Education, 62, 243-257.

Perkins, A. W. (1991). Learning and study strategies inventory(LASSI): A validity study. Unpublished doctoral dissertation, The College of William and Mary, Williamsburg, Virginia.

Schumacker, R. E., Bembry, K. L., & Sayler, M. (1995). Identifying at-risk gifted students in an early college entrance program. Roeper Review. 18, 126-9.

Weinstein, C. E. (1987). LASSI user's manual Clearwater, FL: H & H Publishing.

Weinstein, C. E., Palmer, D. R., & Schulte, A. C. (1987). LASSI: Learning and Study Strategies Inventory. Clearwater, FL: H & H Publishing.

Statistical Package for Social Sciences (SPSS, Version 8.0). Chicago, IL.